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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/577,429

04/27/2006

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P0777

4724

34610 7590 12/08/2009

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EXAMINER

COX, ALEXIS K

ART UNIT

PAPER NUMBER

3744

MAIL DATE

DELIVERY MODE

12/08/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/577,429	Applicant(s) KIM, DO-HYUNG	
	Examiner ALEXIS K. COX	Art Unit 3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2, 4-12, 17-26, and 28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the repetition of the step of stopping the compressor while rotating in a single direction, argued by the applicant to be inherently present in figure 2, is not shown, as is detailed in the response to arguments below and must be shown or the feature(s) canceled from the claim(s). No new matter should be entered
2. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 5-12 are objected to because of the following informalities: claims 5-12 are presently dependent on claim 4, which has been cancelled. Amendment to depend on claim 2, which now has all limitations of cancelled claim 4, is suggested. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. Claim 2 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 2 explicitly claims repeatedly stopping and rotating the compressor in the second rotation direction at pre-set time periods. The specification does disclose repeatedly rotating the compressor in the second direction at pre-set time periods, but does not disclose repeatedly stopping the compressor at pre-set time intervals after a single defrosting operation. (See figures 2, 7, 9, 13, 14, 15, 16, and 19). In every figure which explicitly states stopping the compressor, the step immediately before is temperature checking; the only figure, figure 19, which stops the compressor after a pre-set time period without checking temperature does so as part of switching from clockwise to counterclockwise rotation, and only does so once rather than repeatedly. For the purpose of examination, this claim is being interpreted in accordance with the specification as meaning a single stopping of the compressor after

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the pre-set time period, and repeated rotation of the compressor in the second rotation direction each pre-set time period.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Loprete et al (US Patent No. 6,591,621) and TaeDuk (US Patent No. 5,285,646), as informed by Hix et al (US Patent Application Publication No. 2003/0143083).

Regarding claim 2, Loprete et al discloses a method for controlling an operation of a compressor of a cooling system comprising varying a cooling capacity of the cooling system a compressor is installed in by controlling a rotation direction of the compressor (see column 4 lines 23-24) according to a load condition of the refrigerator, wherein the cooling capacity of the system increases when the compressor is rotated in the first direction and decreases when the compressor is rotated in the second direction

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(see column 4 lines 38-44; see also lines 55-56). Loprete et al discloses the use of load matching for fewer and shorter defrost cycles (see column 26 lines 51-52). This must comprise a step in which when the temperature inside the refrigerator and a pre-set defrosting temperature are identical, a defrosting operation is performed, as otherwise it is not load-matching. Further, as the temperature inside the refrigerator is greater following a defrosting cycle and the compression ratio is greater when rotated in the first direction, rotating the compressor in the first direction when the defrosting operation is terminated is also part of load-matching. Further, the system of Loprete is controlled by a thermostat (228, see column 25 lines 13-17), and the thermostat cited is programmable; as it is digital, it must have some defined sampling period, because that is part of the conversion from analog to digital, and therefore it therefore would have been obvious to one of ordinary skill in the art at the time of the invention to assess required compressor settings at pre set time periods in order to cause the thermostat to function. Additionally, stopping the compressor and rotating it in the second direction following a defrost cycle would have been obvious to one of ordinary skill in the art at the time of the invention, as it is common knowledge that immediately after defrosting the temperature of the controlled area will often be in the appropriate temperature range of the lower cooling capacity to be needed, and this is the method step that will result in the energy savings Loprete is directed to creating. It is noted that Loprete discloses the use of a two speed motor, instead of a continuously variable motor or inverter, to drive the compressor; it is further noted that Loprete does not disclose the entry of modes by a user. TaeDuk explicitly discloses varying the speed of a compressor as part of the

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reversal process, in order to prevent noise and damage to the compressor (see abstract); TaeDuk also explicitly discloses the use of multiple modes (heating, cooling, defrost, figures 5 and seven). Hix et al explicitly discloses that in a two-stage reversing compressor, the start-up torque in the reversed mode may cause damage to a compressor (see paragraph [0004]). It therefore would have been obvious to one of ordinary skill in the art at the time of the invention to use the variable speed motor of TaeDuk to operate the compressor of Loprete in order to have both a greater variety of pressure ratios available and prevent damage to the compressor due to excessively speedy switching of directions.

Regarding claims 5 and 6, regardless of which direction the compressor is rotated in it is according to the operation mode of the refrigerator. Loprete also explicitly discloses a current sensor (see column 22 lines 41-42), which is part of what is used to control the motor. Further, Loprete discloses the implementation of turning off the compressor for a predetermined time period before running it in the reverse of the previous direction, so as not to damage the motor and waste energy (see column 22 lines 4-9). It is noted that Loprete does not explicitly disclose the current sensor to be part of the switching mechanism; however, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the current sensor part of the switching means, as the purpose of Loprete is to provide for less expensive variable load refrigeration by reducing power use, and power varies directly as current., and this will result in a more accurate reduction in power use.

Regarding claim 7, it is noted that Loprete et al does not explicitly disclose the selection of an operation mode of the cooling system by a user. However, it falls within the realm of common knowledge to permit user programming of a thermostat in order to permit timed temperature control of a home, and it would have been obvious to one of ordinary skill in the art at the time of the invention to use a user-programmable thermostat in the system of Loprete et al in order to permit timed temperature control of a refrigerator according to user-specific load patterns.

Regarding claims 8-10, it is noted that Loprete does not explicitly disclose the setting of an operation range of a temperature sensor for sensing the temperature inside the refrigerator according to the rotation direction of the compressor. However, it falls within the realm of common knowledge as mechanically expedient to calibrate sensors to the sensitivity most suited to the application at hand, and it would have been obvious to one of ordinary skill in the art at the time of the invention to program the thermostat of Loprete et al to have a higher sensitivity when running the compressor in reverse, as it would be less likely to inappropriately overreact at the slower potential rate of change in temperature available from the lower capacity of the compressor. Further, the selection of the appropriate temperature ranges according to various system compressor capacities are a matter of routine experimentation, and therefore would have been obvious to one of ordinary skill in the art to implement in order to optimize the efficiency of the system.

Regarding claims 11 and 12, the examiner interprets the intent of the claims to be to set the amount of refrigerant required in the system according to the amount

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necessary when the compressor runs at the lower capacity. As it falls within the realm of common knowledge as mechanically expedient to avoid damage to systems by providing for the worst case scenario, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the appropriate amount of refrigerant for the largest reasonable requirement.

Response to Arguments

8. Applicant's arguments, see page 7, filed 11/10/2009, with respect to the rejection(s) of claim(s) 2 and 4-12 under Loprete et al have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Loprete et al and t__ in light of Hix (US Patent Application Publication No. 2003/0143083).

9. To the extent that the applicant's arguments are still applicable:

It is argued on page 6 that it is inherent that repeated rotation in the reverse direction comprises stopping the compressor in between. This is not the case. Continuous rotation is still repeated rotation, but does not involve stopping in between. Figure 2, as presently constituted, does not disclose repeated stopping; the only step which is explicitly repeated in that of rotation. It is respectfully submitted that even if to repeat an action did require ceasing that action between repetitions, which it does not, repeated rotation of the compressor in a single direction could involve ceasing to actively impart motion without completely stopping the compressor.

The examiner also respectfully suggests that, as repeated stopping while rotating in a single direction was present in the originally filed claims, it is considered to be part

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of the original disclosure; as such, the addition of this feature to the specification and drawings may not constitute the addition of new matter.

The applicant further makes an argument on page 8 concerning the combination of cancelled claim 4 with cancelled claim 1. The examiner can only assume the intended argument concerned claim 2, as is shown by further argument on page 8. Given that Loprete explicitly discloses the use of an induction motor with different sets of windings to accommodate different power loads (see column 4 lines 45-56), and it is well known in the art to vary the frequency of an induction motor in order to vary compressor speed when the compressor is powered by the motor, this argument is unpersuasive.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Cho et al (US Patent Application Publication No. 2004/0241010) explicitly discloses a variable capacity rotary compressor which varies capacity via motor speed, and also has different compression stroke lengths in different directions. Fujio (US Patent No. 5,322,424) discloses a two stage gas compressor with the stages operating in reverse from each other. Hwang et al (US Patent Application Publication No. 2009/0113908), Kim (US Patent Application Publication No. 2009/0049849), and Koehl (US Patent No. 7,612,510) all disclose relevant cooling or pump systems, and Harrod et al (US Patent No. 7,562,536) discloses a relevant compressor control method.

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11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEXIS K. COX whose telephone number is (571)270-5530. The examiner can normally be reached on Monday through Thursday 8:00a.m. to 5:30p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frantz Jules can be reached on 571-272-6681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/AKC/

/Frantz F. Jules/
Supervisory Patent Examiner, Art Unit 3744